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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/991,196

11/20/2001

Chih-Chien Liu

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EXAMINER

SERGEANT, RABON A

ART UNIT

PAPER NUMBER

1796

MAIL DATE

DELIVERY MODE

03/26/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/991,196	LIU ET AL.	
	Examiner	Art Unit	
	Rabon Sergeant	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 March 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-29, 31, 32, 35, 40-44, 46-56 and 58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-29, 31, 32, 35, 40-44, 46-56 and 58 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____. |

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on March 18, 2008 has been entered.
2. The Information Disclosure Statement, filed March 20, 2008, has neither been entered nor considered, because it has not been signed as required by 37 CFR 10.18.
3. The terminal disclaimer filed on March 18, 2008 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent 7,271,101 has been reviewed and is accepted. The terminal disclaimer has been recorded.
4. Claims 35 and 50-53 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicants' amendment to claim 35 renders the claims indefinite. Applicants have amended the claim to recite the step of "etching the cap layer, the conductive protective layer and the wiring layer using the first mask for etching the cap layer, the conductive protective layer and the wiring layer"; however, the last line of claim 35 states, "wherein the first mask is removed prior to the etching of the wiring layer". It is unclear how the first mask can be used to etch the wiring layer if the first mask is removed prior to etching the wiring layer.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 21-23, 28, 29, 31, 32, 35, 46-53, and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-288285 in view of Tobben et al. ('126).

JP 8-288285 discloses a process for forming wiring line layers on a substrate by etching, wherein the substrate has upon it a wiring line layer, a protection insulating film corresponding to applicants' claimed cap layer (see layer 4 within figures and page 9, lines 1-6 of translation), and a resist mask, corresponding to applicants' claimed mask layer (see layer 6 within figures and page 12, line 18 of translation). The reference further discloses steps wherein the mask layer is patterned, the cap layer is etched according to the mask layer pattern, the mask layer is removed, and the wiring line is etched according to cap layer pattern. See page 12, line 11 through page 14 line 10 of the translation. The reference further discloses that after the wiring

lines are formed, a planarized insulating film is applied by bias ECR plasma CVD. See page 14, lines 11-24 of the translation. The position is taken that the disclosed insulating film corresponds to applicants' claimed dielectric material and that in the course of applying the planarized film, the gaps between the wiring lines are inherently filled with dielectric material. Furthermore, the reference discloses at page 11, lines 11-16 of the translation that a high density plasma is generated by bias ECR plasma CVD; therefore, this CVD method is considered to meet applicants' claimed high density plasma chemical vapor deposition method. With respect to claims 49 and 53, it is noted that the reference teaches the use of inductively coupled plasma CVD and helicon wave plasma CVD within paragraph [0046] of the translation.

7. The primary reference differs from the instant claims primarily in that while the primary reference discloses that an antireflection layer corresponding to applicants' conductive protective layer can be used as a cap layer (see translation paragraphs [0007] and [0045]), the primary reference fails to disclose the use of both the antireflection layer and a cap layer. It is noted that the translation discloses at paragraph [0044] that the invention of the reference is not limited to the embodiments; therefore, the reference is not considered to preclude modifications. Bearing this in mind, the position is taken that semiconductor structures having applicants' claimed layer structure of wiring line layer, conductive protective layer (antireflection layer), and cap layer were known at the time of invention. This position is supported by the teachings of Tobben et al. See figures; column 2, lines 32-46; and column 3, lines 6+. Therefore, the position is taken that it would have been obvious to incorporate the claimed conductive protective layer between the wiring line layer and the cap layer of the primary reference in accordance with the teachings of

the secondary reference, so as to realize such advantages as increased protection of the wiring lines conveyed by the use of such a layer.

8. Claims 24-27, 40-44, and 54-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-288285 in view of Tobben et al. ('126) as applied to claims 21-23, 28-35, 37-39, 45-53, and 58 above, and further in view of Muraoka et al. ('005) or Haraguchi et al. ('989) or Wakabayashi et al. ('640).

As aforementioned, the position is taken that the combined teachings of JP 8-288285 and Tobben et al. render applicants' claimed methods of depositing dielectric material between wiring line gaps *prima facie* obvious. Furthermore, the remarks, above within paragraph 6, with respect to claims 49 and 53 also apply to claim 41. However, while JP 8-288285 discloses at paragraph [0042] that tapering layer 4a facilitates embedding of the insulating film, these references fail to disclose the modification of the cap layer to yield the claimed profiles of the cap layer prior to "depositing". However, it was known at the time of invention to utilize etching techniques to produce specific profiles, such as trapezoidal profiles, in the production of semiconductor articles and structures. See Haraguchi et al. as well as the figures of Muraoka et al. and Wakabayashi et al. Therefore, the position is taken that the use of etching to produce other than rectangular profiles or cross-sections within semiconductors was conventional at the time of invention and that such modifications amount to design choices that would have been obvious to one of ordinary skill at the time of invention. Furthermore, as aforementioned, the primary reference provides additional motivation for modifying the shapes of the upper layers.

9. Applicants' response has been considered; however, the primary reference refers to patterning the resist mask 6 using photolithography within paragraph [0026]; therefore, it is unclear how applicants' amendments and arguments distinguish the claims from the prior art. Clarification and/or elaboration of applicants' position is requested.

Any inquiry concerning this communication should be directed to R. Sergent at telephone number (571) 272-1079.

/Rabon Sergent/
Primary Examiner, Art Unit 1796

R. Sergent
March 22, 2008